CLAIMS

WE CLAIM:

1. A valve assembly, comprising:

a valve body having an inlet port, an outlet port, and a flow passage extending therebetween;

a valve element mounted at least partially within the flow passage and moveable between an open position and a closed position to thereby control fluid flow therethrough; and

a valve actuator mounted proximate the valve body, the valve actuator including:

two rails extending substantially parallel to one another,

an armature moveably disposed at least partially between, and electrically coupled to, each of the rails, the armature coupled to the valve element and moveable between at least a first position and a second position, to thereby move the valve element to at least the open and closed positions, respectively,

a first armature lock disposed adjacent at least one of the rails and configured to selectively lock the armature in the first position, and

a second armature lock disposed adjacent at least one of the rails and configured to selectively lock the armature in the second position,

wherein a current flows through the armature in a first or a second direction upon application of an electrical potential of a first or second polarity, respectively, across the rails, to thereby generate a Lorentz force and move the armature to the first or second position, respectively, and the valve element to the open or closed position, respectively.

2. The valve assembly of Claim 1, further comprising:

a first position sensor disposed proximate at least one of the rails and configured to sense at least when the armature is in the first position and supply a position signal representative thereof; and

a second position sensor disposed proximate at least one of the rails and configured to sense at least when the armature is in the second position and supply a position signal representative thereof.

3. The valve assembly of Claim 1, further comprising:

a control circuit adapted to receive valve position command signals and operable, in response thereto, to supply the electrical potential of the first or second polarity across the rails.

4. The valve assembly of Claim 3, wherein:

the control circuit is further operable, in response to the valve position command signals, to supply one or more lock driver signals;

the first and second armature locks are each moveable between a locked position and an unlocked position, to thereby engage and disengage the armature, respectively; and

the first and second armature locks each include a solenoid that moves its associated lock, upon receipt of the lock driver signal, to the unlocked position.

5. The valve assembly of Claim 4, wherein the first and second armature locks each further include a bias spring configured to supply a bias force that biases its associated lock toward the locked position.

6. The valve assembly of Claim 3, wherein the control circuit comprises:

a main control circuit adapted to receive the valve position command signals and operable, in response thereto, to supply one or more control signals;

a main driver circuit coupled to receive one or more of the control signals from the main control circuit and operable, in response thereto, to supply the electrical potential of the first or second polarity across the rails.

7. The valve assembly of Claim 4, wherein the control circuit further comprises a lock driver circuit coupled to receive one or more of the control signals from the main control circuit and operable, in response thereto, to supply the one or more lock driver signals.

8. The valve assembly of Claim 1, further comprising:

a link coupled between the armature and the valve element, whereby the armature is coupled to the valve element.

9. The valve assembly of Claim 1, wherein the valve element is a butterfly valve element.

10. A linear drive motor actuator for moving a valve element between an open and a closed position, the actuator comprising:

two rails extending substantially parallel to one another;

an armature moveably disposed at least partially between, and electrically coupled to, each of the rails, the armature configured to couple to a valve element and moveable between at least a first position and a second position, to thereby move the valve element to at least the open and closed positions, respectively;

a first armature lock disposed adjacent at least one of the rails and configured to selectively lock the armature in the first position; and

a second armature lock disposed adjacent at least one of the rails and configured to selectively lock the armature in the second position,

wherein a current flows through the armature in a first or a second direction upon application of an electrical potential of a first or second polarity, respectively, across the rails, to thereby generate a Lorentz force and move the armature to the first or second position, respectively, and the valve element to the open or closed position, respectively.

11. The actuator of Claim 10, further comprising:

a first position sensor disposed proximate at least one of the rails and configured to sense at least when the armature is in the first position and supply a position signal representative thereof; and

a second position sensor disposed proximate at least one of the rails and configured to sense at least when the armature is in the second position and supply a position signal representative thereof.

12. The actuator of Claim 10, further comprising:

a control circuit adapted to receive valve position command signals and operable, in response thereto, to supply the electrical potential of the first or second polarity across the rails.

13. The actuator of Claim 10, wherein:

the control circuit is further operable, in response to the valve position command signals, to supply one or more lock driver signals;

the first and second armature locks are each moveable between a locked position and an unlocked position, to thereby engage and disengage the armature, respectively; and

the first and second armature locks each include a solenoid that moves its associated lock, upon receipt of the lock driver signal, to the unlocked position.

14. The actuator of Claim 13, wherein the first and second armature locks each further include a bias spring configured to supply a bias force that biases its associated lock toward the locked position.

15. The actuator of Claim 12, wherein the control circuit comprises:

a main control circuit adapted to receive the valve position command signals and operable, in response thereto, to supply one or more control signals;

a main driver circuit coupled to receive one or more of the control signals from the main control circuit and operable, in response thereto, to supply the electrical potential of the first or second polarity across the rails.

16. The actuator of Claim 13, wherein the control circuit further comprises a lock driver circuit coupled to receive one or more of the control signals from the main control circuit and operable, in response thereto, to supply the one or more lock driver signals.

17. The actuator of Claim 10, further comprising:

a link coupled between the armature and the valve element, whereby the armature is coupled to the valve element.

18. The actuator of Claim 10, wherein the valve element is a butterfly valve element.

19. A linear drive motor actuator for moving a valve element between an open and a closed position, the actuator comprising:

two rails extending substantially parallel to one another;

an armature moveably disposed at least partially between, and electrically coupled to, each of the rails, the armature configured to couple to a valve element and moveable between at least a first position and a second position, to thereby move the valve element to at least the open and closed positions, respectively;

a first position sensor disposed proximate at least one of the rails and configured to sense at least when the armature is in the first position and supply a position signal representative thereof;

a second position sensor disposed proximate at least one of the rails and configured to sense at least when the armature is in the second position and supply a position signal representative thereof;

a first armature lock disposed adjacent at least one of the rails and configured to lock the armature in the first position; and

a second armature lock disposed adjacent at least one of the rails and configured to lock the armature in the second position,

wherein a current flows through the armature in a first or a second direction upon application of an electrical potential of a first or second polarity, respectively, across the rails, to thereby generate a Lorentz force and move the armature to the first or second position, respectively, and the valve element to the open or closed position, respectively.

20. The actuator of Claim 19, further comprising:

a control circuit adapted to receive valve position command signals and operable, in response thereto, to supply the electrical potential of the first or second polarity across the rails.